

cords, were covered with grayish-white masses, so as nearly to obstruct the passages. Microscopic examination showed *oidium albicans* or thrush fungus. Section of the brain showed that both hemispheres were filled with minute abscesses about a pin's-head in size. Microscopically, numerous granule cells, white corpuscles, and broken-down tissue. The abscesses were due to embolism.

Dr. L. Emmett Holt reported to the American Pediatric Society, in 1897, five cases of abscesses of the brain in infants, and has collected twenty-seven cases in infants and very young children. His cases occurred at the following ages: Six weeks, three months, five months, nine months, and three weeks. His collected cases varied in age from seven weeks to four years. The bacteriological examinations showed the *streptococcus*, *staphylococcus pyogenes*, *diplococcus*, *pneumococcus*, and, in one case, a child of three months, the *bacillus coli communis*. An organism resembling the *meningococcus* was found in one case. *Oidium albicans* is also a cause of purulent meningitis in infants, and it is not surprising that abrasions about the mouth, so frequently the seat of fermenting detritus, should open a pathway for infection. That the colon bacillus should be found in the brain is noteworthy. Dr. L. N. Boston found it in J. H. Lloyd's case, an adult who died on the fourth day of purulent meningitis. Councilman, Mallory, and Wright have found it, but considered it a contaminating organism. Their investigations show that the *diplococcus intercellularis* is responsible for epidemic cerebro-spinal meningitis in children.

In the case which I present the infection was evidently through the umbilicus, and the lesions of the brain were apparently consistent with a short duration, probably not longer than elapsed between the birth and death of the child. It should be added that the mother made an uneventful recovery.

CONGENITAL IDIOPATHIC DILATATION OF THE COLON.¹

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DILATATION of the colon may be produced by a variety of causes, and various subdivisions based on etiology have consequently been made by writers. The form most frequently seen is that occurring generally in adult life, the result of habitual constipation. In some instances obstinate fecal impaction has developed, followed by death. In certain cases the obstruction has been brought about by the constipation producing kinking of the bowel through the weight of the

¹ Read before the Association of American Physicians, May, 1899.

contained feces. In others there has developed narrowing of some part of the bowel through external pressure. In the case of a boy of five years, reported by Gee,¹ a cyst compressed the anus. Sometimes the constipation and dilatation appear to be the direct result of an acquired atony, itself depending upon a debilitated system, perhaps the result of some acute exhausting disease. This may occur even in children, as in a case of Gay's,² in which great sluggishness of the bowels, with abdominal distention, developed in a boy of seven years who had just recovered from typhus fever.

All dilatations of the types mentioned may be properly designated "acquired." In another class of cases dilatation is the result of some congenital stenosis or obstruction in the colon or rectum, which immediately or slowly causes distention to develop above it. Treves³ reports such a case, and takes the ground that probably all cases of dilatation of the colon in young children are of this nature. But this view is not supported by the evidence of the numerous post-mortem examinations.

A third class of cases may be called congenital idiopathic dilatation of the colon, and to this class our present study is especially directed.

The term "idiopathic" is employed here, as often, in a necessarily broad and rather loose manner. I would use it to designate an innate tendency to dilatation which is not dependent upon discoverable organic cause. The form of dilatation to which the term applies is not due to stricture or occlusion of any kind. It is not caused by constipation, as in acquired cases, but is itself the cause of this symptom, since the presence of fecal impaction or of scybalous masses is not the rule in this disease. It is not the result of a shortened mesocolon or other discoverable organic condition producing kinking. Although the great length of the sigmoid flexure in infancy probably predisposes to the development of the dilatation, yet this is in itself not the cause in idiopathic cases, else we should find the disease much more frequent than it is. Besides, in nearly all cases it is not the sigmoid flexure alone which is distended. The dilatation is not due to paralysis and atony alone, since so many cases develop in apparently healthy children, and so many autopsies show, in fact, hypertrophy of the intestinal walls. It cannot be said, on the other hand, to be due to congenital over-development of the walls of the colon, causing rigidity, since not every case has shown sufficiently marked hypertrophy, and, in any event, there is no proof that the hypertrophy is not a secondary development. It is not due to colitis, since statistics indicate that colitis is a terminal condition only. In fact, the term idiopathic expresses rather our state of ignorance, for there must naturally be some cause for the faulty tendency to dilatation

¹ St. Bartholomew's Hospital Reports, 1884, xx. 20.

² Transactions of the Pathological Society of London, 1854, v. 174.

³ Lancet, 1893, i. 276.

in these cases. As to what this may be, however, we can do no more than theorize.

The term "congenital," too, requires comment, since it has been used by writers with different significations. I have employed it to designate not only an actual dilatation present at birth but also the existence of a congenital tendency to early dilatation, the latter condition being probably much the more common. With this definition in mind we can understand how some cases—those of the severest type—suffered distention and constipation, from earliest infancy, as soon as food began to enter the colon, and rapidly grew worse; others, with a less grade of the disease, resisted distention decidedly for a time or tolerated it well, although showing great lack of expulsive power always; and still others had periods of improvement, in which the distention largely disappeared, although the faulty nature of the colon remained, and relapse occurred later in nearly every instance.

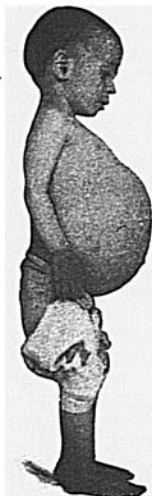
It is impossible, however, to draw a sharp and always applicable line of distinction between congenital idiopathic cases and those which are not so. In the absence of an autopsy we cannot affirm positively that no stenosis existed, even though we may have reason to believe it. So, too, in cases in which the early history is incomplete or unsatisfactory, it is impossible to be sure that the symptoms were present from birth or soon after. Again, in cases in which the symptoms were clearly somewhat late in appearing we cannot always conclude with certainty whether the constipation present was a cause or a result of the dilatation. Consequently the cases selected as illustrations of idiopathic dilatation of the colon, and on which classifications have been based, differ with writers, and are not always the same, according as the writer's conception of the definitions of idiopathic and congenital differed. I have therefore studied the originals of all the published reports of cases as far as these are known to me, and, that those interested may judge for themselves, I have avoided the tabulation of symptoms or mere enumeration of cases, but have given abstract synopses of those cases which seemed to have any claim whatever to be regarded as congenital idiopathic dilatation of the colon. In a secondary list, not used here for purposes of study and analysis, I have mentioned briefly most of the other cases quoted in medical literature, but which, for reasons given with each, it would seem should be excluded from this category. It should be stated that although most of these cases have been called idiopathic, they are not commonly described as congenital.

Before giving the synopses I wish to relate the following history of a case once under my own observation:

Roy S., born June, 1894, and aged, at the time of examination, two years and eleven months. The family history was good. He had never been ill except for constipation, which he had more or less since birth,

and for which very strong purgatives were required. When he was five months old marked distention of the abdomen began, with more or less pain nearly all the time. The child would sometimes go as long as a week before a movement could be obtained, but would then have diarrhoea for several days, with even increased gaseous distention of the abdomen. This condition persisted with little change until November, 1896, except for about a couple of months of each of his two summers, at which times the bowels would move naturally. In November, 1896, being then about two years and five months old, he was supposed to have swallowed a campaign button, and all purgative medicine was stopped for a week, after which it seemed well-nigh impossible to procure an evacuation, and the child had such pain and was so swollen that the parents "feared he would burst." Relief was obtained, at least to a degree, by the use of a rectal tube, which allowed the gas to escape; but the necessity of using the tube often daily, and of giving purgatives and enemata, persisted, and finally the procedures ceased to give much relief. He was brought to the hospital of the University of Pennsylvania, May 21, 1897.

FIG. 1.



The following notes are abstracted from the clinical history:

Condition on Admission. The patient is a well-nourished child, slightly pale, intelligent, and bright. The abdomen is enormously protruding, tympanic everywhere upon percussion, and measures 63.5 cm. (25 in.) at the umbilicus and 69.8 cm. (27½ in.) at the most prominent portion. (Fig. 1.) The umbilicus is pouting, and active peristaltic movements can be seen. The outline of the greatly enlarged colon is at times distinctly visible. No tumor can be felt anywhere. There is a large amount of veining over the trunk. The costal margin is very much everted by the pressure of the gas in the bowels. Ordered hot fomentations to relieve pain, the insertion at times of a rectal tube, enemata of soap and water, followed by some containing turpentine and sometimes asafœtida. Milk diet was given.

May 22d. The child retained the enemata for some hours, and finally passed a large bowel movement, which reduced the size of the abdomen a trifle.

23d. Strychnine ordered internally.

June 7th. The child has continued in much the same condition, and there has been vomiting on

two or three occasions. A daily enema of milk of asafœtida has been given, and the milk diet continued, with, later, a little beef-juice added. Hot fomentations have been employed frequently, also high, laxative enemata, which relieved the distention slightly. There is not much pain, and the child is bright, but homesick. Yesterday morning he developed slight, watery, greenish diarrhoea. About 5 p.m. he grew irritable and had slight pain; the temperature rose by evening to 105.2° F.; pulse

140, respiration 37. Local antipyretic measures were ordered, with whiskey, digitalis, and quinine. The diarrhoea continued, and last night there were ten stools. The abdomen is tense, and the child has some pain. The temperature is less this morning and the abdomen is smaller, but it still measures 58.4 cm. (23 in.) at the most prominent part. Paregoric ordered.

9th. Fever has persisted. The abdomen now measures 68.6 cm. (27 in.) at the umbilicus and 72.4 cm. (28½ in.) at the most prominent portion. The diarrhoea is gradually lessening, but the child refuses nourishment and is losing ground. Enemata and strychnine stopped and bismuth ordered.

11th. As the condition grew worse through failing strength and continued great abdominal distention, operation was advised. Right inguinal colotomy was done by Dr. John Ashhurst, Jr., the colon being opened shortly beyond the cæcum. A large amount of semi-liquid feces and of gas came away through the opening after an injection into it, and the abdomen became much more relaxed.

16th. During the rest of the eleventh and upon the following day a large amount of fecal matter was passed through the artificial anus, and the abdomen went down nearly to its natural size. The patient's general condition seemed at that time fairly good. The abdomen did not again become distended, but the child gradually failed in strength and died to-day.

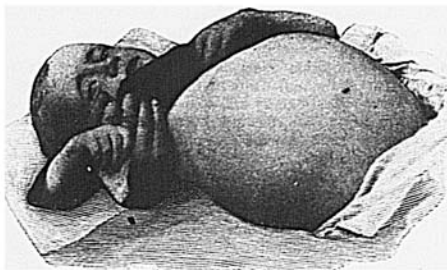
The body was removed to the home of the parents and an autopsy performed there by Dr. R. J. Hillis, the physician who had sent the boy to the hospital. He reports that nothing was found abnormal in the belly except a marked constriction, about 25.4 cm. (10 in.) in length, situated in the ileum shortly above the cæcum. There was a small quantity of fecal matter above this. The ileum was not distended. There was no constriction found in the colon, and the abdomen was collapsed. No measurements of the colon were made, or any observation on the character of the intestinal walls.

I have seen a second case, which I believe to have been of the same nature as the one just described, although I do not include it as such, for want of a satisfactory clinical history. The child suffered from habitual obstinate constipation, and had an enormously distended, tympanitic abdomen. It was seen a number of years ago in the medical clinic of the University of Pennsylvania, and was made the subject of a lecture by Dr. William Pepper. I had a photograph of it taken on the day of its single visit to the hospital. (Fig. 2.) The presence of peritonitis was excluded, and the case was supposed to be one of extreme atony of the bowel. I now believe it to have been an idiopathic dilatation.

The following are the synopses of the cases which may with reason be considered congenital idiopathic dilatation of the colon. It will be noticed that the word "colon" has frequently been used by the writers to designate the large intestine, in contradistinction to the rectum and sigmoid flexure. In other instances it includes the sigmoid flexure as well as the rest of the colon. Each abstract shows what the writer has

intended in this respect as far as he has made his meaning clear. The age given is in nearly every instance that of the patient when first coming under continued observation. The "history" details the condition up to this time, while the result of the examination and of the continued observation is described after the words "under observation."

FIG. 2.



Henoch. (*Beiträge zur Kinderheilkunde*, 1861, 123.) *History*. Boy, aged one and three-quarter years. Great distention of abdomen, with constipation on the third day after birth. Condition continued, constipation sometimes lasting eight days; tympanites; purgatives of little use; enemata better; passage of syringe nozzle best, this bringing away large amounts of gas and feces, always soft, with considerable lessening of girth. *Under observation*. No obstruction discoverable in rectum. Under continued medication grew much better; daily stools; abdomen much smaller. But symptoms returned after treatment stopped. Child lost sight of.

Peacock. (*Transactions of the Pathological Society of London*, 1872, xxiii. 104.) *History*. Man, aged twenty-eight years. Constipated from birth; purgatives, and, later, enemata always required. Worse after a severe attack at seventeen years. Flatulence annoying and abdominal distention often great. Obstruction set in six weeks before death; relieved, but returned; belly enormous; flatus passed in large quantities; died unexpectedly. *Autopsy*. Large intestine from cæcum to upper rectum enormously distended, 15 to 20 cm. (6 to 8 in.) in diameter, containing semi-solid feces; ulceration of mucous membrane. Ileum somewhat distended; rectum healthy.

Gee. (*St. Bartholomew's Hospital Reports*, 1884, xx. 19.) *Case I. History*. Boy, aged four and one-half years. At three months difficulty in defecation began, with hard stools. At twelve months swelling of abdomen began and constantly increased. *Under observation*. Great abdominal distention; coils of intestine visible; great dyspnoea; constipation, relieved by enemata; rectal tube brought away gas and gave some relief, the abdomen growing smaller. Lived a few weeks. Diarrhoea before death. *Autopsy*. Great elongation and enormous distention of sigmoid flexure; 10 cm. (4 in.) in greatest diameter; walls thickened. Sigmoid formed two huge sacs, connected by a narrow strip of bowel. Rectum distended; colon natural.

Case II. History. Boy, aged four years. Great distention since one month old; habitual constipation. *Under observation*. Extreme tympanitic distention; hard feces felt in rectum. Died soon after. *Autopsy*. Distention of colon, especially of upper part of sigmoid flexure. Contraction of rectum

and of lower part of sigmoid below a hard concretion. Semi-liquid feces above this; no real stenosis.

There appears no evidence that the concretion caused obstruction and dilatation, and this is apparently Gee's opinion also.

Bristowe. (*British Medical Journal*, 1885, i. 1086.) *History*. Girl, aged eight years. "Long been subject to constipation of the bowels." No stool for fully seven weeks; latterly constant vomiting. *Under observation*. Distended abdomen, growing more so; no pain or tenderness; absolute constipation in spite of treatment; lived three weeks. *Autopsy*. Coils of distended intestine outlined through abdominal walls. After incision sigmoid flexure and descending and transverse colon found greatly distended, 7.6 to 9 cm. (3 to 3½ in.) in diameter. Ascending colon, cæcum, and small intestine also distended, but less so. Rectum distended to 5 cm. (2 in.) above anus. No stricture; thickening of muscular coat of large intestine; some ulceration of mucous membrane. Large intestine full of thick, semi-solid feces. Hardened mass above anus. No flatus.

Bristowe attributes the condition chiefly to the acute obstruction; yet the history of constipation for years, with the presence of marked hypertrophy of the walls of the colon, point strongly to a congenital origin.

Cheadle. (*Lancet*, 1886, ii. 1117.) *History*. Boy, aged three years. Tumidity of abdomen and obstinate constipation began at three months. All purgatives failed in turn; stools dry and hard; for two years almost never a stool without enema. Sometimes colon retained two or three enemata given in one day. *Under observation*. Abdomen greatly distended, especially in position of colon below ribs; girth 59 cm. (23½ in.); tympanitic. Under treatment with mild laxatives and tonics improved, and recovery about complete, with daily stool, in two months.

Fütterer. (*Virchow's Archiv*, 1886, cvi. 555.) *History*. Boy, aged fourteen years. Abdomen distended from birth and grew larger slowly, but last year rapidly. Bowels moved about three times a day spontaneously. *Under observation*. Enormous abdomen, 91 cm. (35½ in.) in girth; tympanitic; no vomiting. Distention somewhat diminished by daily injection. Exploratory operation; nothing done; death. *Autopsy*. Sigmoid flexure distended into a huge sac; wall hypertrophied; no ulceration. Colon and rectum not distended. Passage from rectum into sac distorted, so that obstruction by pressure was produced.

Fütterer regards the case as an instance of true congenital malformation of the sigmoid flexure, which makes the propriety of including it in this list somewhat doubtful.

Hughes. (*Transactions of the Pathological Society of Philadelphia*, 1887, xiii. 40.) *History*. Boy, aged three years. Obstinate constipation in infancy; abdomen gradually grew larger and constipation worse; stools only after laxatives, but never hard. After enterocolitis at two years constipation more obstinate, and once lasted nineteen days. *Under observation*. Abdomen enormously enlarged; peristalsis of intestine visible; tympanites; no stool for twenty-four days. Improved; then severe diarrhoea and death. *Autopsy*. Colon and upper rectum greatly distended, especially latter and lower colon, which measured 10 cm. (4 in.) in diameter. Walls much thickened; ulceration in mucous membrane.

Hirschsprung. (*Jahrbuch für Kinderheilkunde*, 1888, xxvii. 1; *Pädiatrische Arbeiten*; *Henoch's Festschrift*, 1890, 78.) *Case I. History*. Boy, aged eight months. Constipated from birth; purgatives failed, and only repeated enemata produced evacuation. Constipated habit continued, and all sorts

of remedies required to obtain evacuations, which were of normal color and consistence. Health good otherwise. Abdomen moderately distended; scybala felt in rectum; once only one stool in fourteen days. Lost health.

Under observation. Never stool without aid; those obtained were of normal appearance. When constipated abdomen became enormously swollen, this disappearing for a brief time after opening bowels. Occasional vomiting; sound passed easily into rectum. Later unassisted movements, followed by great abdominal swelling, profuse diarrhoea, and death at eleven months. *Autopsy.* Great dilatation of sigmoid, and especially of transverse colon; wall thickened; ulcerations present. Rest of colon widened; rectum natural. No constrictions.

Case II. History. Boy, aged seven months. Constipated from birth; stool only by purgatives; no pain; no vomiting; abdomen at times greatly distended, and this gradually increased. At six months puncture with trocar. Then lost health; had diarrhoea and occasional vomiting. *Under observation.* Abdomen 56 cm. (22 in.) in circumference; peristalsis visible; profuse diarrhoea and wasting persisted until death in four or five weeks, and abdominal distention until shortly before. *Autopsy.* Great distention of sigmoid flexure and transverse colon; hypertrophy of walls; ulceration of mucous membrane.

Case III. History and observation. Boy, aged two and one-half months when he died. No stool from birth. Seen on third day, with much distended and tense abdomen. Passage of finger into rectum brought a stream of meconium out. Constipation continued, with never spontaneous stools; then more frequent stools with purgatives; then spontaneous stools; no actual diarrhoea. Abdomen always somewhat, and at times greatly, distended, with coils of intestine visible. Distention increased; health failed; no vomiting until day before death; never much pain. *Autopsy.* Distention of caecum and ascending, transverse, and descending colon and sigmoid flexure. Hepatic and splenic flexures narrower. Walls of colon thickened; no ulceration; no strictures. Colon nearly empty.

Case IV. History. Boy, aged ten years. From the time he was little he had constipation, distended abdomen, occasionally abdominal pain, usually ending in expulsion of feces and gas, exceptionally vomiting. *Under observation.* Enormous distention of abdomen; tympanitic; not tender; feces in rectum; no stool for eight days. Continued treatment with enemata produced evacuations of bowels and diminution in size of abdomen, though girth still 63 to 67 cm. (24½ to 25½ in.). Had periods of spontaneous stools, not hard, sometimes thin. Six months later in fair health, but never a stool without enema.

Formad. (University Medical Magazine, 1892, iv. 625.) History. Man, aged twenty-nine years. Large abdomen and frequent constipation to one and one-half years of age. Then distention and constipation became worse. As he grew up constipation would sometimes last a month. Abdomen increased constantly in size; tympany. Later, pain, dyspnoea, weakness. At twenty years he became a museum freak ("balloon man"). Died suddenly on water-closet. *Autopsy.* Abdomen measured 220 cm. (86½ in.). Whole colon, especially transverse, distended with gas and semi-liquid feces, measuring 25 to 76 cm. (10 to 30 in.) in circumference; no thickening of walls; no kinking or other stricture; no impaction. Rectum and small intestine normal.

Hadden. (International Clinica, 1893, iv. 53.) History. Boy, aged eleven weeks. Bowels natural until three weeks old, when symptoms began (pain, vomiting, constipation, distention) and continued. *Under observation.* Abdomen greatly distended; peristalsis visible. Treated for three weeks, then stool obtained, but child died of exhaustion. *Autopsy.* Distention of last 61 cm. (24 in.) of small intestine and of colon up to sigmoid flexure. Mucous membrane ulcerated; no stricture.

Walker and Griffiths. (British Medical Journal, 1893, ii. 230.) History. Boy, aged eleven years. Distention of abdomen noted when a few weeks of age; increased rapidly, and by three years was enormous. Bowels acted regularly until three years; then always constipation, relieved by enemata. Always dyspnoea; little pain generally; latterly more. Occasionally pas-

sage of large amount of gas relieved the distention. Died suddenly while receiving enema. *Autopsy.* Girth of abdomen, 119 cm. (47 in.). Colon enormous, especially transverse and descending portion, 58 cm. (23 in.) in circumference; contained soft feces. Rectum, small intestine, and lower part of sigmoid normal. No constriction. Walls of colon much thickened; chronic inflammation of mucous membrane.

Osler. (*Archives of Pediatrics*, 1893, x, 111.) *History.* Boy, aged ten years. Always prominent abdomen; for years trouble with bowels. *Under observation.* Abdomen 63 cm. (24½ in.) in girth; tympanitic; not tender; some pain. Coils of intestine visible. Generally constipation, easily relieved; occasionally diarrhoea; some vomiting. Laparotomy showed "entire gut enlarged," especially the sigmoid flexure, which measured 45 cm. (17½ in.) in circumference. Walls much thickened; no stricture or impaction. Artificial anus made; fluid feces and gas escaped; distention entirely relieved. Recovery. No return of symptoms during several years; then lost sight of.

Mya. *Case I.* (*Lo Sperimentale*, 1894, xlviii, 215.) *History.* Girl, aged two and one-half months. Vomiting, distention of abdomen, and constipation began day after birth; stool only after repeated injections. Then tumefaction persisted, with constipation for eight days, and frequent vomiting. *Under observation.* Abdomen 45 cm. (17½ in.) in girth. Rectal tube passed readily. By enemata obtained passages with tolerable regularity. Seen again at eight and one-half months, with return of constipation. Abdomen 53 cm. (20½ in.). The emptying of lower bowel, especially of gas, produced partial diminution in girth, but vomiting not entirely arrested. Child lost sight of.

Case II. *History.* Boy, aged five and one-half months. Twenty-four hours after birth swelling of abdomen began and constantly increased. Stools only every four or five days with enemata. Twice no stool for eight days, then vomiting and finally diarrhoea. *Under observation.* Distended abdomen, girth 52 cm. (20½ in.); tympanitic. Sound removed quantities of gas, with some diminution in size. Later developed diarrhoea, with rapid diminution in girth. Died collapsed. *Autopsy.* Large intestine everywhere thickened. Mucous membrane ulcerated. Colon irregularly distended; transverse colon most dilated, measuring 16 cm. (6⅜ in.) in diameter.

Generisch. (*Jahrbuch für Kinderheilkunde*, 1894, xxxvii, 91.) *History.* Girl, aged one and one-quarter years. No stool after birth. On second day abdominal distention began; increased greatly. First stool on eighth day of life, after purgatives, and abdomen then grew smaller. Later often long periods of constipation; occasionally vomiting. *Under observation.* Abdomen enormous, 59 cm. (23½ in.) in girth; tympanitic; outline of dilated colon visible; sound removed gas and lessened distention; a week before stool obtained. Later, spontaneous, soft stools, with some diminution in size of abdomen; then return of symptoms; finally diarrhoea, vomiting, and death after three months of observation. *Autopsy.* Colon much distended, 8 to 11 cm. (3 to 4⅞ in.) in diameter; walls thickened; mucous membrane ulcerated. Transverse colon largest; sigmoid flexure partly distended, passing into a narrower portion. Bowel contained soft feces.

Rolleston and Haward. (*Transactions of the Clinical Society of London*, 1896, xxix, 201.) *History.* Boy, aged twelve years. Distention of abdomen began at two months. Was subject to gradually increasing constipation; often no stool for several days or even weeks, and then would be very ill and have much distended abdomen. Last two years often vomited. *Under observation.* Abdomen enormously distended; tympanitic; peristalsis visible. Obstinate constipation, with distention and abdominal distress, alternated with daily movements, with relaxation of abdomen. Hard feces in rectum at times. Watched three months. Died in one attack. *Autopsy.* Descending colon and sigmoid flexure greatly distended; rest of colon and first part of rectum less so; no stricture. Walls of colon hypertrophied; mucous membrane ulcerated.

Martin. (*Montreal Medical Journal*, 1897, xxv, 697.) *History.* Boy, aged three and one-half years. No stool until five days old. Later always con-

stipated, sometimes going eleven days. Enlargement of abdomen began at one year, and steadily increased, with occasional lessening following escape of flatus. Latterly slight pain. Stools scybalous; later semi-solid; two intermittent attacks of diarrhoea. *Under observation.* Great distention, girth 68 cm. (26½ in.). Coils of intestine and vermicular movements visible; tympanites; no tenderness; rectum normal on digital exploration. Exploratory operation done; no stricture found; wound closed. Second laparotomy two weeks later; intestines punctured by trocar; death in a few days. *Autopsy.* Perforative peritonitis. Sigmoid flexure elongated; enormously distended; 38 cm. (14½ in.) long, 5 to 8 cm. (1½ to 3½ in.) in diameter; contained solid feces; walls thickened; no ulceration; partial narrowing of lower portion through possible thickening of mesocolon. Rectum normal. Descending colon somewhat dilated and much thickened.

The narrowing in this case does not appear to have amounted to a stenosis.

Hichens. (*Lancet*, 1898, ii. 1121.) *History.* Man, aged twenty years. Constipated "from the day of his birth until the day of his death." Abdomen always greatly distended; purgatives and enemata always needed; stools only every ten to fourteen days, and then scybalæ, followed by several loose movements. Sudden death. *Autopsy.* Abdomen enormous. Sigmoid flexure enormously distended and much elongated; 57 cm. (22½ in.) long, 35 cm. (14 in.) in smallest circumference; contains gas and semi-liquid feces. Walls much thickened; slight distention of colon; no stricture anywhere.

Hobbs and de Richemond. (*La Médecine Moderne*, 1898, ix. 652.) *History.* Girl, aged two and one-half years. Considerable enlargement of abdomen, giving rise to difficulty in extracting child at birth. After birth evacuation of bowels always difficult; vomiting for three months; abdomen continued to grow larger; purgatives and enemata of little effect. *Under observation.* Enormous abdomen; tympanitic. Sound entered rectum easily 25 cm. (9½ in.); brought away feces on its end. Puncture with small trocar allowed 3½ litres of gas to escape, but abdomen soon filled again. Watched over a month. No improvement. Operation advised. Child disappeared.

Cases not to be included for reasons stated with each. Most of them mentioned in lists by other writers, who have not necessarily designated them as congenital.

Banks. (*Dublin Journal of Medical Science*, 1846, i. 235.) Man, aged fifty years. Had had some former attacks of same kind. This acute and fatal. No reason to consider case congenital.

Chapman. (*British Medical Journal*, 1878, i. 566.) Specimen only. Subject aged fifty-eight years. No history.

Money and Paget. (*Transactions of the Clinical Society of London*, 1888, xxi. 103.) Adult, aged fifty-five years. Clearly not a congenital case. Fatal.

Little and Callaway. (*Transactions of the Pathological Society of London*, 1851, iii. 106.) Adult, thirty-four years of age; imbecile; inordinate appetite. Died from acute constipation and over-distention of abdomen. Every reason to believe acquired.

Goodhart. (*Transactions of the Clinical Society of London*, 1881, xiv. 84.) Girl, aged seventeen years. Well until eight months before. Clearly secondary to anaemia.

Bristowe, second case. (*British Medical Journal*, 1885, i. 1086.) Man, aged twenty-four years. For "some long time" subject to constipation. No history of any congenital dilatation. Died of peritonitis.

Morris. (*British Medical Journal*, 1886, ii. 1211.) Woman, aged twenty-four years. Acute attack. Recovery. No reason to suppose congenital.

Wallmann. (*Virchow's Archiv*, xiv. 202.) Man, aged sixty-six years. Several true diverticula. Not like congenital idiopathic dilatation as here understood.

Ammon. (*Angeborene chirurgische Krankheiten*, S. 39. Atlas.) Specimens from bodies of new-born or fetus; some clearly with stenosis. No histories given, although pathologically some exhibit the characteristic lesions.

Vulpian. (*Gazette des Hôpitaux*, 1877, No. 75.) Case of dilatation, with narrow anus.

Lacave. (*Verhandl. van het Genootschap ter Bevord. der Genees en Heilkunde te Amsterdam II. Deel. 1 Stuck*, 1858, 7.) Clearly result of atresia ani.

Gruber. (*Virchow's Archiv*, 1872, lvi. 432.) Autopsy specimen. Probably acquired dilatation, with congenitally abnormal length.

Ebers. (*Hufeland's Journal*, August, 1836, lxxxiii. 62.) Male, aged seven-teen years. Symptoms rather of acute obstruction, although always constipated habit; yet no history of distention. No reason to assume was congenital.

Wells. (*Transactions of the Society for Improvement of Medical and Surgical Knowledge*, 1812, iii. 158.) Man, aged fifty-eight years. Acute symptoms; no history of previous attacks.

Lewitt. (*Chicago Medical Journal*, 1867, xxiv. 359.) Man, aged twenty-one years. First attack at twelve years. No evidence that case was congenital.

Harrington. (*Chicago Medical Journal and Examiner*, 1878, xxxvi. 400.) Man, aged fifty-one years. Acute attacks; probably old dilatation; but no symptoms of congenital affection.

Herringham and Clarke. (*St. Bartholomew's Hospital Reports*, 1895, xxxi. 57.) First case. Man, aged seventy years. Dilatation probably old, but no proof that it was congenital. Second case. Child, aged four months. Began as colitis; dilatation appears to have been secondary to this.

De Haen. (*Ratio Medendi*, iv. Cap. iii.) Quoted by Gee. Chapter III. refers to cases of drowning. Reference clearly wrong. Chapter IV. has some cases involving dilatation of colon, but none to be placed in this category.

Parry. (*Posthumous Works*, vol. ii. 380.) Man, died of constipation apparently. No history of a congenital origin.

Gay. (*Transactions of the Pathological Society of London*, 1854, v. 174.) Boy, aged seven years. Condition followed an attack of typhus; probably result of this, and therefore acquired.

Eisenhart. (*Centralblatt für die innere Medizin*, 1894, 1153.) Woman, aged fifty-three years. Appears to have been an acute abdominal dilatation resulting from chronic constipation; no history of early distention.

Strahan. (*Lancet*, 1893, ii. 1245.) Man, aged thirty-two years. Lunatic. No history of abdominal distention. No reason to regard colonic dilatation as congenital.

Lespinnasse. (*Journal de Médecine de Bordeaux*, 1888-1889, xviii. 427.) Woman, aged seventy-eight years. Enormous distention of sigmoid. No evidence of congenital origin.

Favalli. (*Gazzetta medica di Milano*, 1846, v. 213.) Man, aged fifty years. Acute case; no history of early distention.

Berti. (*La Pediatria*, 1894, iii. 136, 161.) First case. Seen by Porro. Congenital dilatation, but associated with imperforated anus. Second case. Child, aged thirteen months. Autopsy showed dilatation of sigmoid flexure, which may have been congenital, but symptoms entirely wanting. No constipation. No abdominal distention until last day of life. Third case. Boy, aged two months. Autopsy showed long sigmoid, with saccular dilatation of a portion of it. Appeared like a congenital malformation, but never any symptom during life. Died of marasmus.

Chandle. (*Lancet*, 1886, ii. 1107.) Boy, aged five and one-half years. Constipated habit only for last nine months, then abdominal distention. Recovered entirely. Case apparently result of temporary atony. No reason to regard as congenital.

Osler. (*Archives of Pediatrics*, 1893, x. 111. Second Case.) Child of seven years. Supposed to be idiopathic, but autopsy two years later (personal communication from Dr. Osler) showed stenosis of sigmoid flexure.

The cases of Berti's are the only ones in this list which might with any reason be included in the first list; but as we are considering a

clinical condition as well as an anatomical one it is better to exclude them from it.

A glance at the history of Roy S. and at the synopses of the published cases, a total of twenty-four in all, shows a very characteristic group of symptoms. Chief among them and first to appear are two—viz., constipation and abdominal distention. In twenty-two of the cases one or both of these was witnessed within three months, and nearly always within a few days after birth. In two cases (Bristowe's and Formad's) the time is not distinctly stated. Generally it is noticed that within a few days after birth the child tends to be much constipated. In some cases this has been complete and obstinate, and only relieved after repeated administration of purgatives or enemata. In other cases therapeutic means have been more promptly successful. In a few, as in the cases of Hadden, Rolleston and Howard, Cheadle, and in one of Gee's, several weeks or even as long as three months appear to have elapsed before the trouble with the bowels began. In Fütterer's patient there was never constipation. In nearly half the cases constipation was the first symptom noticed, although in most of these distention of the abdomen developed very soon after.

In almost all of the remaining cases the development of constipation and of distention seems to have been simultaneous. There are, however, some exceptions to this. Thus in a few cases abdominal distention was quite late in developing. For instance, in Martin's patient and in the first of Gee's there was no distention until the age of one year, although constipation began much before. In my patient distention was not noticed until the age of five months. In a very few cases the history seems to indicate that the development of abdominal distention has antedated that of constipation. The only certain instance of this, however, and the most marked, is that of Walker and Griffiths, in which distention was noted at a few weeks of age and constipation not until three years. The degree of distention has varied much according to the case, but always seems to have been very marked. Frequently its degree has depended to a considerable extent upon the degree of constipation. The relief of constipation by enemata or purgatives would in most instances be attended by a decided diminution in the size of the abdomen. On the other hand, in my own case attacks of diarrhoea seemed to produce little diminution in the abdominal girth. Often nothing has given such relief to the distention as the evacuation of gas through a rectal tube. The abdominal distention was always tympanitic. Frequently the outline of the distended colon could be perceived through the thinned abdominal walls, and peristaltic movements were visible.

Particularly in the cases which have survived the first year or two of life there has been a decided tendency to repeated attacks, or rather

exacerbations. In these constipation, though always troublesome and constantly growing more so, became more extreme and the abdomen more distended. With rare exceptions it has been only in such attacks that pain or vomiting has been a prominent feature. As a rule, pain and tenderness have been slight or absent, and vomiting only occasional.

As to the character of the stools, it seems only exceptional that they have been scybalous. Henoch, for instance, calls attention to the fact that the insertion of a rectal tube in his patient always brought away feces which were soft. In one of Hirschsprung's cases there had been no stool since birth, yet the finger introduced into the rectum produced the discharge of a stream of meconium. These are examples only of the usual condition. At autopsy, too, the feces in the colon have been nearly always in a semi-liquid state. Hard, fecal masses have been the exception. In fact, everything points to an inability of the colon to propel its soft contents rather than to a blocking by hard masses.

Not infrequently there have been attacks of diarrhœa, and it is especially noteworthy that in a number of instances severe diarrhœa has been a terminal symptom.

The general health has always suffered sooner or later, although in a few instances not for a considerable time. Dyspnœa is liable to be produced by the pressure against the lungs.

It is interesting to note that twenty of the cases have been male and only four female.

The prognosis, while not totally bad, is most unfavorable. Eighteen of the twenty-four cases are known to have terminated fatally. Only three of these—those of Peacock, Formad, and Hichens—are known to have reached adult life. The remaining died in infancy and childhood—the oldest at the age of fourteen years, eleven of them before the age of five years, and six of these before that of three years. Only two patients—those of Chendale and of Osler—can be said to have recovered, the latter consecutive to the formation of an artificial anus. When heard of some years later he was, I believe, doing well (personal communication from Dr. Osler). The four remaining non-fatal cases disappeared from observation—one of them somewhat improved, the other three not at all so.

Eighteen autopsies and one laparotomy on a case which recovered show a striking uniformity in the principal features of the pathological anatomy of the disease. In all there was dilatation of more or less of the large intestine, generally described as "enormous." There seems to be an erroneous opinion in some quarters that it is the sigmoid flexure which is chiefly or solely dilated in this disease. I wish to call particular attention to the fact that there are but two cases described—Fütterer's and one of Gee's—in which this appears to have been the only portion of

the colon dilated; and but two others—Martin's and Hichens'—in which the remainder of the colon is said to have been but slightly involved. In all the remaining, with one exception, both sigmoid flexure and the rest of the colon were much dilated; sometimes the sigmoid flexure most (Gee, Osler); sometimes some other part of the colon most (Hirschsprung, first case; Formad, Mya, Generisch). In the one exception referred to, that of Hadden's case, the colon, without the sigmoid flexure, was involved. In a few cases the rectum was distended in a portion of its course. The small intestine was never distended to any considerable extent.

The degree of dilatation of the colon has been often enormous. It has sometimes appeared at autopsy to fill the whole abdominal cavity, crowding everything else out of sight. A very characteristic pathological feature has been the thickening of the walls of the colon. This has been reported in nearly every case. Only in Formad's is it stated to have been absent. In a few others it is not referred to (Peacock, Gee, second case). In my own case no observation was made regarding it. Generisch is disposed to regard the thickening as an early change, and as one of the causes of the loss of peristaltic power. It seems, however, just as likely—certainly in many cases—that it is a later change occurring in an effort at compensation. Ulceration of the mucous membrane is another alteration quite often seen. It is doubtless a later change and not a necessary one. It was nearly always found in cases in which severe diarrhoea had terminated life.

The diagnosis is easily deduced from the symptoms detailed. It rests upon the very early presence of troublesome constipation; the development with this, soon after, or rarely before, of great tympanitic abdominal distention; the discovery often of the distended colon outlined through the abdominal walls; the absence of evidence that the constipation is due to impaction; the absence of any discoverable organic obstructive cause, as shown by the exploration of the rectum and colon; the absence of any previous debilitated state of health which might occasion colonic atony; and, finally, the confirmation by an autopsy that no structural obstruction of the intestine was present. This last, although, of course, a "post-mortem diagnosis," is often indispensable. As pointed out at the opening of this article, it is sometimes impossible—as in many other diseases—to make an infallible diagnosis without autopsy. A sharp diagnostic line between idiopathic and obstructive congenital cases cannot always be drawn.

Treatment can only be (1) hygienic and medicinal and (2) operative. In the first class improvement of the general health is indicated, since this may help to increase the peristaltic power of the colon. Massage has been recommended by some, and condemned by others, on the ground that it may produce perforation of ulcerated spots. Carefully performed in

cases without diarrhoea or tenderness, it seems indicated. Electricity may be used for the same purpose. Means must be employed to empty the bowels either by purgatives or enemata. Objections exist to the use of either, since eventually they tend to weaken still further the muscular power. In the case of Hughes the child seemed to be made distinctly worse by enemata. Yet it is often a case of "needs must," and that remedy has to be selected which best unloads the bowels and gives relief. The use of the rectal tube to remove gas has sometimes been a great comfort to the patient. In three instances—Martin's, Hobbs' and de Richemond's, and one of Hirschsprung's—puncture of the intestine with a fine trocar has been performed, in order to allow gas to escape.

In any severe case tending to grow worse seasonably early operation of some sort is to be advised. In spite of the gravity of the procedure, not to employ it seems still more grave. Exploratory laparotomy was performed on the patients of Fütterer and Martin, but nothing more radical was attempted. An artificial anus was made by Halsted in Osler's case, and the child recovered. The same operation was performed in my own case. Had it been done earlier, before the rapid failure of health set in, the chance of recovery would have been greater. The operation done by Treves (*loc cit.*) on a child with dilatation consecutive to congenital stenosis might well be employed in idiopathic cases—viz., the entire removal of the functionally useless dilated colon and the joining of the small intestine with the anus. As this is a serious operation the attempt to relieve by the formation of an artificial anus may well be made first.

ON THE TOXICITY OF THE URINE.¹

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THE question of the toxicity or non-toxicity of urine has been engaging the attention of scientists for a long time, and the number of authors who have contributed to this subject is very great. From a practical point of view the subject has received its greatest impetus by

¹ Read at the meeting of the Association of American Physicians, May, 1899.